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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/521,131	01/12/2005	Giuseppe Pasqualini	IT 020018	6805

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PHILIPS INTELLECTUAL PROPERTY & STANDARDS
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EXAMINER	
MARTELLO, EDWARD	

ART UNIT	PAPER NUMBER
4154	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/521,131	PASQUALINI ET AL.	
	Examiner	**Art Unit**	
	Edward Martello	4154	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01/12/2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 January 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Objection

1. The disclosure is objected to because of the following informalities: Page 7, line 16. The subscript for the first Y value in the parenthesis, $Y_{man,}$ should be corrected to $Y_{max.}$

Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 2, 4, 8 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bachmann et al. (U.S. Patent 5,436,673, hereafter '673) and in view of CCIR Recommendation 601 (now International Telecommunications Union, ITU-R BT.601-6, hereafter '601).

4. Regarding claim 1, Bachmann teaches a method of non-linear processing of at least one set of input parameter values (Y,S,H) ('673; Y, SAT, HUE) of input picture signals (R,G,B,) ('673; Y, R-Y, B-Y) so as to produce output picture signals (R', G', B') ('673; Y, R-Y, B-Y), with output parameter values (Y', S', H) ('673; Y, SAT, HUE), characterized in that the non-linear processing is responsive to hue values (H) ('673; Figs. 3A-3D; col. 3, ln. 54-60) of the input picture signals (R,G,B) 673; Y, R-Y, B-Y).

The specification of the instant application discloses the conversion of the (R,G,B) inputs to the (Y,S,H) color space in a two step process wherein the first step is a linear transformation of (R,G,B) to (Y,C_r,C_b). Bachmann does not teach the use of the (Y,C_r,C_b) color space in this

first linear translation step but uses the (Y, R-Y, B-Y) color space. The (Y, R-Y, B-Y) color space used by Bachmann is also a linear transformation of the (R,G,B) color space and is very similar to (Y,C_r,C_b). The International Telecommunications Union, ITU-R BT.601-6 specification teaches that these linear color spaces are essentially equivalent as shown in the matrix transformations below:

Y	0.299	0.587	0.114	R
C_r	0.5	-0.419	-0.081	G
C_b	-0.169	-0.331	0.5	B

Y	0.299	0.587	0.114	R
B-Y	-0.299	-0.587	0.886	G
R-Y	0.701	-0.587	-0.114	B

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the standard set forth in the added reference, in the Bachmann method, as both the above device input color signal representations and linear conversions are equivalent for the purpose of implementing either invention and would equivalently achieve the desired result.

5. In regards to claim 2, Bachmann further teaches a method wherein the non-linear processing involves the steps of determining a power γ_h (correction values;'673; fig. 2; col. 5, ln. 8-48) depending on the hue values (H) ('673; HUE), and raising a saturation-related input parameter value S to the power γ_h ('673; KORR.SAT; col 2, ln. 62-68). The method of claim 2 as described in the disclosure is accomplished via a lookup table (figure 2) which is written with pre-determined correction values which are then read out of the look up table (LUT) in real-time in response to the 8 bit hue value of each pixel which provides an address value or pointer into the LUT memory as each pixel is processed. In like manner, Bachmann provides a look up table

(RAM) driven by the hue values for each pixel ('673; fig. 1; col 2, ln. 62-68) and provides examples of a number on non-linear correction curves ('673; fig. 3A-3D; col. 3, ln. 54-60).

6. In regards to claim 4, Bachmann further teaches a method wherein the non-linear processing involves the steps of determining a power γ_y (correction values) ('673; fig. 2; col. 5, ln. 8-48) depending on the hue values (H) ('673; HUE), and raising a brightness-related input parameter value (Y) to the power γ_y (KORR.LUM; '673; col 2, ln. 62-68). The method of claim 4 as shown in the disclosure is accomplished via a lookup table (figure 2) containing pre-determined correction values which are read out of the LUT in memory in response to the 8 bit hue value of each pixel which provides an address value or pointer into the LUT memory as each pixel is processed. In like manner, Bachmann provides a look up table (RAM) accessed by the hue values for each pixel ('673; fig. 1; col 2, ln. 62-68).

7. In regards to claim 8, Bachmann further teaches a method wherein the maximum saturation values S_{max} (W.SAT – waveform of fig. 8 verses Y) depend a brightness-related output parameter value (Y') ('673; fig. 7 and 8; output of functional block 44 applied to multiplier functional block 48;'673; fig. 1; col 6, ln. 62-68, col. 7, ln. 1-12).

8. In regards to claim 12, Bachmann and '601 teach the apparatus comprising picture processing circuitry for carrying out the method of claim 1 ('673; fig.2, col.1, ln.56-62; col. 4, ln. 49-65).

9. Claims 3, 5, and 6-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over '673 and '601 as applied to claims1, 2, 4, 8 and 12 above, and further in view of Udagawa et al. (U. S. Patent 4,731,662, hereafter '662).

10. Regarding claim 3, the combination of '673 and '601 teaches the method of claim 2 but does not teach a method further comprising the step of adapting the power γ_h based on histogram data derived from the input parameter values (Y,S,H). However, Udagawa teaches a method comprising the step of adapting the power γ_h (saturation compression; '662, col.4, ln. 23-45) based on histogram data derived from the input parameter values (Y,S,H) (Y,H,C, where C=S; '662, col. 4, ln. 5) ('662; fig. 5; col.4, ln. 23-45) for the benefit of keeping the density distribution of the saturation values of the corrected image similar to the uncorrected image to prevent an unusual look to the corrected image .

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have combined the previous teachings and to include the histogram teachings of '662 to provide a method to handle the condition where the density range of color saturation values of an input image signal is broader than the density range of a target output device so that the compression compensation is controlled in a manner to avoid the loss of picture detail because the histogram equalization allows the color saturation to be increased more for picture areas showing low saturation density levels than for picture areas showing high saturation density levels while preventing the overall corrected signal from exceeding the saturation limit or clipping level of the output device.

11. Regarding claim 5, the combination of '673 and '601 teaches the method of claim 2 but does not teach a method comprising the step of adapting the power γ_y based on histogram data derived from the input parameter values (Y,S,H). However, Udagawa teaches the method comprising the step of adapting the power γ_y (luminance compression; '662, col.4, ln. 23-45) based on histogram data derived from the input parameter values (Y,S,H) (Y,H,C; C=S; '662,

col. 4, ln. 5) ('662; fig. 5; col.4, ln. 23-45) for the benefit of keeping the density distribution of the luminance values of the corrected image similar to the uncorrected image to prevent an unusual look to the corrected image.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have combined the previous teachings and to include the histogram teachings of '662 to provide a method to handle the condition where the density range of Y values of an input image signal is broader than the Y value range of a target output device so that the Y value compression compensation is controlled in a manner to avoid the loss of picture detail because the histogram equalization allows the Y values to be increased more for picture areas showing low Y value density levels than for picture areas showing high Y value density levels while preventing the overall corrected signal from exceeding the Y value saturation limit or clipping level of the output device.

12. In regards to claim 6, Bachmann further teaches a method, wherein the non-linear processing of the saturation related input parameter value S depends on maximum saturation values S_{max} (S.SAT – max value from fig. 8) ('673; col. 6, ln. 62-68, col. 7, ln. 1-12).

13. In regards to claim 7, Bachmann further teaches that saturation values S_{max} (S.SAT – max value from fig. 8) depend on the hue values (H) (HUE) ('673; col 2, ln. 62-68).

14. In regards to claim 10, Bachmann, Udagawa and'601 teach the method of claim 3 and further teach a method wherein for a predetermined hue value (H), the power γ_h (saturation compression) is adapted on the basis of a weighed, average saturation value of the input picture signals, representing pixels in a window of an image ('673; col. 6, ln. 53-68, col. 7, ln. 1-12).

15. In regards to claim 11, Bachmann, Udagawa and'601 further teach that for a predetermined hue value (H), the power γ_h (saturation compression) for a current window is adapted in dependence on the histogram data of the current and/or a previous window ('662; fig. 5; col.4, ln. 23-45) ('673; col. 6, ln. 62-68, col. 7, ln. 1-12).

16. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over '673 and '601 as applied to claims1- 8 above, and further in view of Yamada et al. (U. S. Patent 5,742,296, hereafter '296).

17. In regards to claim 9, Bachmann and '601 teach the method of claim 6 but do not teach a saturation-related output parameter value S' that is substantially determined by the equation: $S' = S_{max} /(S/ S_{max})^{\gamma h}$. Yamada, however, teaches a method for the benefit of preventing over saturation of the S values in the corrected image, wherein a saturation-related output parameter value S' (γ_0) that is substantially determined by the equation: $S' = S_{max}*(S/ S_{max})^{\gamma h}$ $\{\gamma_0 = \gamma_1(1-(1-\gamma_p\backslash \gamma_t)^{**}\gamma_t \gamma_i\}$ ('296; col. 6, ln. 63-67, col. 7, ln. 1-2) where all the gamma values (saturations) are normalized to 1 so that the form of this equation becomes the form of the instant application. In addition, γ_t corresponds to S, γ_p corresponds to S_{max} and γ_1 is approximately equal to S_{max}. ('296; col. 6, ln. 25-45).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have combined the previous teachings and to include the teachings of '296 to provide an additional method to handle the condition where the total range of color saturation values of an input image signal is broader than the input range of a target output device thus allowing the controlling of the saturation compensation in a manner that avoids the loss of color saturation because the equalization allows the color saturation to be increased more for picture

areas showing low saturation levels than for picture areas showing high saturation levels while preventing the overall corrected signal from exceeding the saturation limit or clipping level of the output device.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

US 5204948 A	Method and apparatus for evaluating color image signals
US 5724456 A	Brightness adjustment of images using digital scene analysis - A system and method for processing a digital image signal to optimally map luminance values versus a tonal reproduction capability of a destination application.
US 6018588 A	Image enhancement circuit and method using mean matching/quantized mean matching histogram equalization and color compensation
US 6049626 A	Image enhancing method and circuit using mean separate/quantized mean separate histogram equalization and color compensation
US 6078686 A	Image quality enhancement circuit and method therefor - A image processing apparatus and method for processing an image automatically with high color accuracy and eliminates image noise.
US 6154217 A	Gamut restriction of color image – Adapting input gamut to output device gamut capability
US 6664973 B1	Image processing apparatus, method for processing and image and computer-readable recording medium for causing a computer to process images - A image processing apparatus and method for processing an image automatically with high accuracy and eliminates image noise.
US 6154217 A	Gamut restriction of color image – Adapting input gamut to output device gamut capability

Any inquiry concerning this communication or earlier communications from the examiner should be directed to EDWARD MARTELLO whose telephone number is (571)270-1883. The examiner can normally be reached on M-F 7:30-5:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Angela Ortiz can be reached on (571) 272-1206. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/E. M./
Examiner, Art Unit 4154

/Angela Ortiz/
Supervisory Patent Examiner, Art Unit 4154